No 33 Feb. 5th. 1813

#6

An Experimental Essay
on
Camphire
1813

Robert Bitterhouse Barton

That p
very ca
procure
and b
ever sin
dered a
tful. A
Laurus
it appe
which
a tree
this be
is obt
shore a
certain
the Ba
Altho
bundl
such
of pro
bles, s
the f
Cubeb
Mintp
Lavend
out
pecul

That particular substance, called Camphire, appears to have been very early known, more especially by the Arabian Physicians. It is procured from many of the Asiatic Islands, particularly from Japan and Borneo. Though its use as a medicine is of great antiquity and ever since its introduction into Materia Medica it has been considered an important article; yet its natural History is still doubtful. Until very lately it was thought to be obtained from the Laurus Camphora; but from Dr. Roxburg's letter to Dr. Barton it appears, that we have been entirely deceived. The tree from which it is obtained (agreeably to this information) is the Shorea, a tree totally different from any species of Laurus. Whether this be the only source from which the camphire of commerce is obtained, or whether it be also obtained from the Laurus Camphora are questions of no material importance. We are certain that it may be obtained from two species of Laurus the Benzoine & Sassafras which are natives of the United States. Altho they contain it, agreeably to Dr. Barton, in great abundance its extraction however has never been attempted in such quantity as to render it an article of commerce or of profit. Besides these already mentioned, numerous vegetables, seeds & volatile oils contain it. Some of them are in the following order; the Amomum Cardamomum, Piper Cubeba, Thymus Serpyllum & Vulgaris, Rosmarinus officinalis, Mentha piperata, Salvia officinalis & the essential oils of Mayoran Lavender, turpentine & Sage. From its being thus diffused throughout nature, it is therefore now universally considered as a peculiar principle of vegetables, and not as a resin or gum

It is obta
distillati
line and
correct m
the vesu
import i
is a con
durable a
specific
its smell
of 150° u
of heat
Flavum
Flame
um. D
to the ne
and a p
repeated
The solu
kinds of
volatile
the mixtu
was
convinc
used at
on acca
properti
suspend
gums. B
pable po

It is obtained in its impure state from the above mentioned sources by distillation, which is afterwards purified by the addition of quick-lime and then is sublimed in a sublimer in the form of concave & convex masses of different thickness, by the application of heat to the vessel containing the impure compound. It is in this state we import it from Europe & Asia. Camphire then (as we receive it) is a concrete friable substance, of a white colour with a considerable degree of transparency and chrystalline appearance, specific gravity less than water. Its taste is bitter and acid and its smell penetrating and peculiar. It evaporates at the temperature of 150° unchanged, but suddenly melts when exposed to a degree of heat above 302° of Farenheit. Its vapour is exceedingly inflammable and when kindled it burns with a very white flame and a great deal of smoke and leaves no residuum. Its composition is not well understood; but agreeably to the received opinion of the present day it consists of Camphoric acid and a peculiar base. This acid is obtained from camphire by repeated distillation with nitric acid

The solvents of Camphire are the concentrated acids, different kinds of Ethers, alcohol, spirits of various kinds, oils fixed & volatile. Milk has been used to dissolve, rather suspend it, & the mixture was thought to be a valuable preparation; but experience convinces us that it answers no important purpose, unless used at the moment of preparation or during very cold weather on account of its liability to fermentation by which its properties become changed or totally destroyed. It may be suspended in various ways by the addition of different gums. It may also be diffused in water when reduced to an impalpable powder previously, by rubbing it with sugar or any

hard so
but in

Th
too gi
in order
promol
prosper
in water
but tha
as were
Vitality
anomo
certain
colour
instead
plant
tion or
off of
I have
result o
cere lie
I draw
extent
the contr
destruct
Having
Camphor
baralow

hard substance and then stirring or agitating the mixture; but in this state it will not remain long when set aside.

In the third Volume of the Philosophical Transactions Dr. Barrow gives us the result of some experiments made by himself in order to ascertain the efficacy or inefficacy of Camphire in promoting vegetation. By them he was convinced that it not only possesses the property of affording nourishment to plants when placed in water impregnated therewith, and increasing their growth and vigour but that it also possesses the singular property of resuscitating such as were considerably schrivelled and an apparently destitute of vitality. In reading his observations I was struck with a strange anomaly which he related! He observes whenever he used a certain quantity the growth, the vigour, the luxuriancy and the colour were always increased; but upon increasing this quantity instead of the same effect being produced, the destruction of the plant was the inevitable consequence. In those instances the destruction or death was preceded by a sphacelation of the leaves & falling off of the petiole. I candidly confess that upon this subject I have never made any experiments to prove or disprove the result of Dr. Barton's; but I do not hesitate to declare my sincere belief of the facts related and that therefore upon them I draw this conclusion, whenever camphire is used to a certain extent it increases the growth and vigour of vegetables; but on the contrary whenever this quantity is increased, it tends to their destruction

Having thus given a short sketch of the natural History of Camphire, enumerated its solvents, and said a few words on its comparative efficacy in promoting vegetation; I shall in the next place

proceed to
month of Aug
me to stat
to inquir
ness of th
upon my
to counter
instances
ness and
The Second
the space
function
$\vartheta - \frac{1}{2}$ to 2
Laying
to the re

proceed to relate some of those experiments which I made during the months August, September & October. However in the first place permit me to state those inconveniences under which I then laboured and to enquire into their magnitude in facilitating or preventing the correctness of them. The first inconvenience is that they were all made upon my self. How far the operation of the mind tends to influence or to counteract their results I will not pretend to say; but in almost every instance my pulse was examined by several of my friends whose kindness and attention enabled me to proceed with more ease and certainty. The second is the partial distension of the stomach. This I infer from the space of time being not sufficient for the stomach to perform its function and then to evacuate its contents. I generally began from 1 hour & ½ to 2 hours after breakfast or the same length of time after tea. Laying these inconveniences aside I am then confident as to the result of those which will be related.

Oct 21.

Oxaim

defined

in the f

pun

No. Calsa.

shure w

the stor

on the

Causes

was ef

ction

perceiv

In th

strain

5

8

for th

was in

force &

ossed

- the

elevati

strength in the

the f

the pre

a dr

Experiment 1st

On 21st [illegible] my pulse beating 63 strokes in a minute [illegible] [illegible] sugar and then dissolved in a [illegible] the pulse was [illegible] [illegible] the [illegible] of time

Time 5 10. 15 20 25 [illegible] 60 [illegible] 11 110 120
[illegible]) 67 69 71 71 74 70 74 7. 70 7. 75 76

There was no sensible difference with respect to the [illegible] the stomach neither was there any [illegible] or sensation of [illegible] in the [illegible] or the [illegible] of [illegible] [illegible] in order to obtain [illegible] [illegible] sweet [illegible] but there was evidently a [illegible] of [illegible] pain and [illegible] in [illegible] difference in the odour

Experiment 2

On the 22 my pulse beating 71 strokes in a minute I took 11 grains dissolved in butter with the following result

5 10 15 20 . 25 30 40 50 . 60 70 80 90 . 110 120
80. 78 76 72 71. 71 67 66 66. 65 63 61 62 61

For the first 20 minutes it will be seen that the frequency of the [illegible] increased, but [illegible] there was a gradual diminution in frequency during the remaining time. The symptoms which [illegible] were in the following order, a sensation of warmth in the stomach, then a diffusion of it over the whole body, exhilaration of spirits and serenity of mind, an apparent increase of strength in the muscular system. They occurred during the [illegible] of the first hour or so long as [illegible] restrained which [illegible] the [illegible] to [illegible] by [illegible]

[illegible]

notwithstanding my efforts to the contrary ~~[illegible]~~, a cold, clammy sweat partially invaded the surface of the body which appeared to decrease the temperature thereof by its evaporation. By this diminution of heat aided by the decreased frequency of the pulse numerous other symptoms ensued, which were dejection of spirits, giddiness, drowsiness, chillness, lassitude, disinclination to move about and oppression at the stomach with an occasional eructation of froth & gas impregnated with the odour of Cam[illegible]. When the two hours expired I walked about the house; but I still felt debilitated until I got dinner a short time afterwards which entirely banished all the symptoms then present.

Experiment 3

On 27th of August at 10 A.M. my pulse beating 71 strokes in a minute I took 12 grains: which was previously divided into [illegible] doses with white sugar and then taken in this dry state with the following result

5	10	15	20	30	40	50	60	70	80	90	100	110	120
73	75	74	72	70	70	68	66	65	63	60	60	62	62

This & the three succeeding experiments were made while [illegible] and in order to ascertain the frequency of the pulse with [illegible] accuracy the dose was not taken until I had been perfectly at rest for 30 minutes previously. The symptoms which occurred were not remarkable; there was a pleasurable sensation of heat in the [illegible] attended with full but soft pulse and an occasional eructation of gas; easy and full respiration; urine scanty & pale coloured [illegible] no sensible alteration in its odour; copious sweat after the expiration of 50 minutes which lasted until I got up sometime afterwards but no perceptible difference in its colour, no inconvenience resulting from this copious sweat, I was enabled to attend to my business [illegible]

Experiment 14th

At the evening of 2nd Sept. my pulse being found to be [illegible] [illegible] by a [illegible] [illegible]. [illegible] the [illegible] as in the 3rd Experiment and in the same manner — with the following [illegible]

5 10 15 20 25 30
80 78 76 75 73 73

Copious sweat was induced which continued between 2 and 3 hours during which time the [illegible] were [illegible] but [illegible]. The cough and irritation of the Trachea were suspended or considerably alleviated, but as soon as the sweat was discontinued they returned with reiterated violence accompanied with restlessness hot and dry skin and other symptoms of [illegible] which lasted until between 4 & 5 O'clock in the morning when I fell asleep and thereby procured a few hours repose. — From 9 O'clock until 4 I had no sleep nor the least inclination to indulge myself in that way, during which time my mind was in a very active condition, flying from subject to subject and from scene to scene

Experiment 15th

On the 5th night at 11 P.M. my pulse beating [illegible] [illegible] I [illegible] 16 [illegible] prepared as in the [illegible] experiment [illegible] the [illegible]

5. 10 15. 20 25. 30 40.
78 77. 77. 74. 72 72 69

[illegible] [illegible] attended [illegible] to the frequency of the pulse but it continued to decrease as long as sweat, which [illegible] at the expiration of 35 [illegible] was [illegible] by a [illegible] [illegible] continuance [illegible] in bed. There was slight nausea from the [illegible] [illegible] of [illegible] attended with [illegible] and [illegible] [illegible]. [illegible] [illegible] the [illegible] [illegible] induced, [illegible] quantity of urine and the [illegible] [illegible] [illegible] but [illegible] in the [illegible] of the [illegible]

Ex

On 16th of S

5
72

Sweat 5,

Coff; no su

Symptoms

on 18th ma

treat a tea

and 30 tra

been prevented

with the Cod

Then

anesthes

or tears

the wheels

Carried; the

The blood

and the

heart beat

day;

am

Experiment 6th

On 16th of Sept at 11 A.M. my pulse beating 78 I took 8 grains of Lobelia in the manner with the following result.

5	10	15	20	25	30	40	50	60
72	73	73	71	69	69	66	66	64

Sweat appeared after the expiration 50 minutes from first dose, no sensible interruption upon the stomach and no other symptoms worthy of enumeration

Experiment 7th

I [illegible] the [illegible] of [illegible] Tobacco by its effects when taken in [illegible] dose [illegible] on 1st my pulse beating 75 I felt three grains dissolved in about a teaspoonful of spirit and then at the expiration of 15 and 30 minutes, the two halves of Sixty grains, which had been previously divided by rubbing it with sugar were taken with the following result 5 10. 15 20 25. 30 40 50 60 70
80. 77. 77 73 73 70 72 68. 66 63
From this, much as particular attention was paid to the variations of the pulse; it however continued to be [illegible] but infrequent. During the first half hour the sensations of warmth & fullness were confined to the stomach, after which the skin became warmer, redder, and more relaxed; the superficial veins appeared to be surcharged with the blood which remained in this situation for one hour without the succession, as in former experiments of general or partial sweat: lassitude, yawning, drowsiness, giddiness and disinclination to walk about, now came on [illegible] with an [illegible] of preserving my head & body in their [illegible] and [illegible] position. [illegible] I [illegible]

to bed and immediately afterwards fell asleep, which continued so profoundly as to produce a total unconsciousness of the lapse of 9 or 10 hours. The next morning I had no recollection of any thing that occurred after getting in bed. I could not discover from the bedclothes whether I had sweated during the night.

Experiment 5th

In order to ascertain the [illegible] of [illegible] I determined to [illegible] [illegible] the quantity [illegible] Accordingly on the 2[illegible] at 11 A.M. my pulse beating 73 strokes, I took 10 grains which had been previously divided by [illegible] at the expiration of 15 30 and 45 minutes severally, I [illegible] 4 grains of [illegible] making in the aggregate 32 grains with the following results

3 11 15 20 25 30 45 60

79 78 18 75 74 70 68 65

from this period my pulse [illegible] until it beat 61 [illegible] [illegible] another aspect [illegible] therefore [illegible] occurred from the period until the expiration of the [illegible] in the following order [illegible] sensation of [illegible] in the stomach, frothy and [illegible] nausea and inclination to vomit, [illegible] giddiness [illegible] and [illegible] lassitude [illegible] the [illegible] body. The [illegible] perspiration [illegible] to all [illegible] but from what source it emanated could not positively be

determined that it was generally [illegible] to prevent from [illegible] vomiting. Shortly after which dinner came on, whether I went to Carlotta as usual, but [illegible] the [illegible] rate and [illegible] Nausea still [illegible] with such unmitigated violence as to bring me almost entirely [illegible] taking any food. Nothing was taken I intended to obviate the disagreeable and debilitating effects produced by this dose rather than to gratify any fullness of appetite which might still remain; and to assist therein a strong mixture of Sherry and water was resorted to. [illegible] I [illegible] was no relief in the contrary I think it tended somewhat to aggravate them. After dinner my situation was nearly the same for several hours [illegible] my feelings were extremely uncomfortable but I am [illegible] incompetent to give a just description of them at the time. I felt no acute pain, but one continued series of uneasiness and oppression at the stomach attended with [illegible] depressed, pulse and cold and clammy sweat from the prostrate and debilitated state. I did not entirely recover until the next day, for until then there was no return of appetite. My stomach did not digest the dose in less than eight or ten hours, because until after 6 hours had elapsed, there were throbbing and gaseous eructations which evidently proved the existence of Pancreatitis in the stomach. Little horror I reflect upon this experiment, and it was this, that deterred me from increasing the quantity in any subsequent experiment.

[illegible] I then [illegible] there were other experiments made with the same quantity of Opium [illegible] in the frequency of the pulse [illegible] exhibited in a solid form [illegible] alone, but as there was so small difference in them I gave nothing more than three grains in succession [illegible] quantity, the [illegible] in a liquid form [illegible] difference at the same hour of day and after taking the same breakfast [illegible] increase of the frequency of the pulse from 5 to 10 strokes more than that very same quantity taken in a solid form. So far as I am capable of judging from these, I do not hesitate to declare my sincere belief of the fact but to account for the difference or to give a probable explanation is a difficult task. However I believe this difference in the frequency to depend not upon [illegible] but upon the direct application of the Camphor (when thus exhibited in this liquid form) to the whole or greater part of the surface of the stomach thereby producing a more prompt and powerful reaction which is [illegible] soon communicated to the heart and arteries. I am induced to believe this conclusion is correct, because in several cases where Camphor was taken in substance and where the frequency of the pulse was not increased but [illegible] the expiration of 20 minutes, I have noticed, that it was in a single instance able [illegible] this time and [illegible] would be quite [illegible] I may [illegible] as [illegible] the frequency of the pulse increased before it

spirat
more e
ment
bed,
30, 40,
frequen
ent to
the actu
be restra
the brai
when its
ing sy
tion, vor
state of
indirect
muscly
rectly i
the fing
gin succ
vented al
Camphir
most a
taken
during
the Com
In a m
of the pul
12; it un

expiration of 20 or 25 minutes it never will be afterwards more especially if the dose be large. Because if the experiment be made with a pretty large dose while lying in bed, we may expect sweat to succeed after the space of 30, 40, or fifty minutes which always tends to lessen the frequency of the pulse. And moreover suppose the experiment to be made with a large dose when exposed to the action of air, and suppose, by this means, sweat to be restrained, it then operates so powerfully upon either the brain or Stomach as to produce indirect debility when its stimulus is communicated to the brain the following symptoms will occur, elevation of spirits, intoxication, vertigo, stupor, sleep, and sometimes death. This state of the brain must necessarily affect respiration indirectly by influencing the action of the Intercostal muscles also the Diaphragm, and this must directly influence the action of the heart, consequently the frequency will be thus lessened. The Nausea which often succeeds the use of large doses when sweat has been prevented also tends to lessen its frequency. Altho I believe camphor to be a powerful and diffusible stimulant I must acknowledge that in several instances I have taken more than 12 grains in substance without producing an increased frequency of the pulse even at the commencement, before sweat was induced. In a majority of experiments it increases the frequency of the pulse from 5 to 12 strokes, rarely ever more than 12; it universally increases its fullness in the beginning

of which
day from
not or m
sensato
violent
expiratio
in the Gl
which w
to avoid
experiem
grains o
which
or 40 g
in cont
3 or 4
stomach
pressure
in bed
Gel ch
However
pressure
the stom
expiratio
the natu
to escape
and part
one - ounce
a sedative
strict Gy

of which I am as confident as I am of the truth of any problem in Euclid. Here my confidence depends not as much upon the testimony of others or upon the sensation imparted to my fingers as it does on the violent throbbing of all the large arterial branches, more especially the Carotid and temporal. This was perceived in the fullness I perceived in some of my first experiments which were made in bed, and it ever afterwards became so evident as not to escape my observation. Having experienced little or no inconvenience from taking 16 grains when sweat supervened at the usual time and which was promoted, I am induced to believe that 30 or 40 grains might be taken with impunity provided we could be certain, that sweat would be excited in 30 or 40 minutes; but if it should not, the brain or the stomach will most undoubtedly suffer. I am firmly persuaded that had the eight experiment been made in bed when sweat would have been promoted, its dreadful effects would have been alleviated, if not prevented. However I confess that I should dislike to make the experiment. The 3rd and 5th experiments prove to my satisfaction the stimulant power of Camphire. For though after the expiration of 30 minutes my pulse had descended below the natural standard and from which time it continued to descend until I got up, partly by the profuse sweat and partly by the long continued rest, yet no inconvenience resulted. I felt no wise debilitated. Now if Camphire be a sedative, this profuse sweat ought to add to, rather than abstract from its sedative or debilitating power.